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SCHEDULE OF MEETINGS

26 April-3 May	**Expert Committee on the International Pharmacopoeia, fourteenth session, Geneva**
4-5 May	**WHO/UNICEF Joint Committee on Health Policy, Geneva**
8-26 May	**Ninth World Health Assembly, Geneva**
28 May-2 June	**Executive Board, eighteenth session, Geneva**
4-8 June	**Advisory Group on Prevention of Accidents in Childhood, Geneva**
5-14 June	**PASB/AMRO Executive Committee, twenty-eighth session, Washington, D.C.**
6-13 June	**Study Group on the Toxic Hazards of Pesticides to Man, Geneva**
11-16 June	**Study Group on International Standards of Drinking Water, Geneva**
11-19 June	**Inter-Regional Conference on Malaria for the Eastern Mediterranean and European Regions, Athens**
12-26 June	**European Conference on Post-Basic Nursing Education, Peebles, Scotland**
18-23 June	**Expert Committee on Organization of Medical Care, Geneva**
21-29 June	**Expert Committee on Malaria, sixth session, Athens**
25-30 June	**Joint FAO/WHO Expert Committee on Milk Hygiene, Geneva**

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DEVELOPMENTS IN SEROLOGICAL METHODS IN SYPHILIS

The success of penicillin treatment of the treponematoses is frequently quoted as one of the most spectacular of modern achievements in public health. In fact, its success has momentarily overshadowed other developments, particularly those in laboratory techniques.

Nevertheless, the efficacy and reliability of the routine serological tests for the titration of reagins remains one of the essential conditions of success, whether it be in the detection of cases, in the determination of the results of treatment in outpatient clinics and private practice, or in the assessment of the results of campaigns among large population groups.

Progress has been made in recent years on several fronts. Purer and better-defined antigen components, such as cardiolipin and lecithin, have been produced; other antigen preparations, such as sitolipin, vegetable extracts, and synthetic phospholipids, have been tried out; new tests utilizing antigens in the treponemes themselves have been developed (immobilization, agglutination, immune-adherence, and complement-fixation tests). These tests have thrown new light on the biology of the treponeme and on the immunology of the diseases it causes, and make it possible to come to closer grips with the problem of false positive reactions which today seem to occur with greater frequency, while true reactions are becoming rarer as a result of penicillin treatment.

Role of WHO

Since 1949 WHO has been taking a direct interest in the development of research by co-ordinating research undertaken in various parts of the world, studying the practical application of the laboratory results, and establishing international standards and reference preparations. In these fields, WHO has obtained the co-operation of some of the world's principal serological laboratories such as the Statens Seruminstitut in Copenhagen and the Venereal Disease Research Laboratory of the US Public Health Service (VDRL)—both of which have acted as international serological reference centres in the WHO programme—the Division of Laboratories and Research of the New York State Department of Health, and the International Treponematosis Laboratory Center, Johns Hopkins University, Baltimore, Md.; it also receives technical advice from a number of expert committees and sub-committees.

As a result of these joint efforts, serological laboratories the world over can now obtain, for the standardization of their working antigens, international reference preparations of cardiolipin and lecithin whose specifications are given in an annex to Volume II of the International Pharmacopoeia. WHO has also published a monograph on these antigen components.[1]

A certain number of freeze-dried sera have been prepared in co-operation with 18 laboratories, under the auspices of the Subcommittee on Serology and Laboratory Aspects of the Expert Committee on Venereal Infections and Treponematoses. In 1957 these sera will be ready for a comparative study in a limited number of laboratories in different

[1] Pangborn, M. C. & al. (1955) *Cardiolipin antigens; preparation and chemical and serological control*, Geneva (*World Health Organization: Monograph Series*, No. 6)

parts of the world. An attempt is also being made to obtain sera—prepared by mixing several samples—which can serve as international reference preparations in methods for the serodiagnosis of syphilis.

The WHO International Serological Reference Laboratory, at Copenhagen, is also in constant touch with 48 national laboratories co-operating in studies of the TPI test.

The International Treponematosis Laboratory Center receives biological material from the various countries to which WHO gives technical assistance. It collects, isolates, and maintains strains of pathogenic treponemes from many parts of the world so that investigators may have interesting material constantly at their disposal to enable them to continue research on the fundamental problems of the serology of the treponematoses. Little by little, light is being thrown on the real nature of these infections, which have a pattern similar to that of other infectious processes for which laboratory methods already exist.

It seemed advisable at the present stage of development in serological techniques to collect in a special number of the *Bulletin of the World Health Organization*,[2] devoted exclusively to the subject, the opinions, views, and conclusions of some of the most eminent serologists who are carrying out and directing research in several of the world's principal serological laboratories. We give below a brief summary of some of the subjects dealt with and an indication of the general trends.[3]

Collaboration between the clinician and serologist

Several authors insist on the necessity for close co-operation between the clinician and the serologist. The serologist must be informed with regard to the clinical symptoms relating to the sera he is to test, and the clinician must know exactly what type of test is applied, the technique adopted, the precise nature of the antigen used, together with its concentration and proportions. It is not sufficient to indicate " cardiolipin test " or " cardiolipin antigen ". The clinician must also know the relative sensitivity and specificity of the tests carried out at various stages of the disease if he is to interpret satisfactorily the results he receives from the serologist. There are many reasons for the difficulties in interpretation, including lack of uniformity and inadequate recording of results. Reporting findings as " positive " or " negative " tends to suggest a diagnosis indicating the presence or absence of syphilis, and it would be preferable to replace these terms by " reactive " and " non-reactive ", respectively. At a time when quantitative tests are becoming more and more important for determining the results of treatment, the " unit " system of recording findings may also lead to confusion, as the " unit " has different values in the different tests. It would seem preferable, therefore, to express the titration in " dils " (dilution reactivity end-points).

There may be discrepancies in serological results if several tests are used—and particularly with a " battery " of tests; in some cases the results may not tally with the clinical diagnosis. This disagreement may be caused by factors within the patient himself, who may have undergone some physiological change between the taking of blood samples, by deterioration of the sample in transit, by unsuitable laboratory temperatures, or by the results being read at various hours of the day in different lights. When samples are sent by post and pass through various climates, as is the case at the present time with the sera exchanged between laboratories in various parts of the world, suitable precautions against haemolysis and contamination must be taken in drawing and shipping samples

[2] *Bull. Wld Hlth Org.* 1956, **14**, p. 187–352

[3] (See page 149 of this number of the *Chronicle* for titles of articles and names of authors)

(use of venules, addition of suitable preservative, etc.).

In the view of some authors, the choice of tests should be made on a regional basis according to results obtained with individuals of the region. The proportion of false positive reactions varies considerably according to the most prevalent diseases in a region. Endemic malaria, for example, provokes a high rate of false positive reactions: some tests will exaggerate these reactions while with others they will be maintained within more or less reasonable limits. Regional assessments of tests have already been made—in 1928 in Copenhagen, in 1930 in Montevideo, and in 1941 in Washington, D.C. A very careful description should be made of the most suitable tests for each region, so that laboratories using the same tests will also adopt identical techniques. The manual of serological tests for syphilis published by the United States Public Health Service, Washington, D.C., 1955, is extremely useful in this respect.

False positive reactions

False positive reactions to serological tests for the treponematoses raise a number of theoretical and practical problems and are receiving more and more attention from syphilologists. Certain diseases are among the causative factors of these reactions. Some of these diseases—bacterial, viral and rickettsial infections—give " acute " biologically false positive reactions, which last almost as long as the cause which provokes them. Others give " chronic " false positive reactions which may persist for years or even for a lifetime. They represent latent or slowly evolving pathological conditions such as the " collagen " diseases. Chronic false positive reactions may reveal a morbid condition some years before the appearance of any clinical symptom, as with lupus erythematosus, for example. Leprosy is one of the diseases which cause the most false positive reactions: it has been observed that the proportion of these reactions in a given group of leprous sera has varied, according to the test used, between about 3% with a slide modification of the Meinicke test and about 80% with the Kahn test.

Treponemal antigens

The *Treponema pallidium* immobilization (TPI) test, employing the living treponeme itself, was introduced into serological practice some years ago. It makes it possible at the present time to overcome certain diagnostic difficulties which defy other methods and it facilitates recognition of false positive reactions. However, this test is rather slow, complicated, and costly and cannot be used as a routine test or treatment indicator; but it does serve as a qualitative diagnostic test. It is particularly useful for the diagnosis of false positive reactions in persons with no syphilitic symptoms or history but who give positive reactions to all the usual tests (as pregnant women and blood donors, for example) and in patients who sometimes give positive and sometimes negative reactions to the usual tests, particularly after cardiac, nervous or mental disease. Efforts have been made to simplify the TPI test technique by using the immune-adherence phenomenon (TPIA test), the method of agglutination of the killed treponema (TPA test), or other similar methods. Unfortunately, these efforts have not solved the problem: the technical difficulties have not been overcome and the immunological interpretation is by no means clear.

In fact, in work on the TPA and TPIA tests, electrophoresis of rabbit serum has shown that the treponema-agglutinating properties of the sera appear to be distributed over several of the serum globulin fractions. The reagin and immobilizing antibodies do not appear to be the only ones involved in the agglutination

reactions and this discovery has opened a new horizon. It has directed study towards the chemical fractionation of the treponeme and the use, in serological tests, of specifically agglutinable fractions. This is an entirely new field of research in which work is only beginning.

There is no doubt that the serological study of the treponematoses has reached a phase of definite evolution. It is probable that the future will provide more sensitive, more specific, and less costly methods as a result of the basic research which is being carried out on the biology of these diseases. In a new monograph to be published by WHO[4] on this subject the authors, Turner & Hollander, describe the latest developments in the biological study of the pathogenic treponemes and give an account of *in vitro* study of the treponeme, of the antigenic relationship between various strains of treponemes, of the role of the antibiotics in experimental treponematoses, of the factors influencing the reaction of the host of the infection, etc.—in short, all the factors which may affect the immunology of the treponematoses and extend our knowledge of the nature of these diseases.

[4] Turner, T.B. & Hollander, D.H. (1956) *Biology of the treponematoses*, Geneva (*World Health Organization: Monograph series*) — in preparation

WHO/UNICEF-ASSISTED BCG VACCINATION PROGRAMMES, 1951-54 *

In 1951 WHO and UNICEF assumed responsibility for international assistance to mass BCG vaccination programmes, previously rendered by the International Tuberculosis Campaign (ITC). Details about these programmes, as well as a statistical documentation of the work carried out up to December 1953, have been published previously.[1] The present report brings the statistics forward to December 1954.

From July 1951 to the end of 1953, 43 million people were tuberculin-tested and 16 million vaccinated. During 1954 these numbers were almost doubled, the totals by the end of the year being 80 million and 29 million, respectively.[2] Thus, during 1954, 37 million people were tested and 13 million were vaccinated, an average of 3 million tests and 1 million vaccinations per month. The progress of the programme, month by month, is shown in Fig. 1. Since July 1951 the monthly output of tests and vaccinations has steadily increased, until, in December 1954, 4.4 million people were tested and 1.6 million vaccinated.

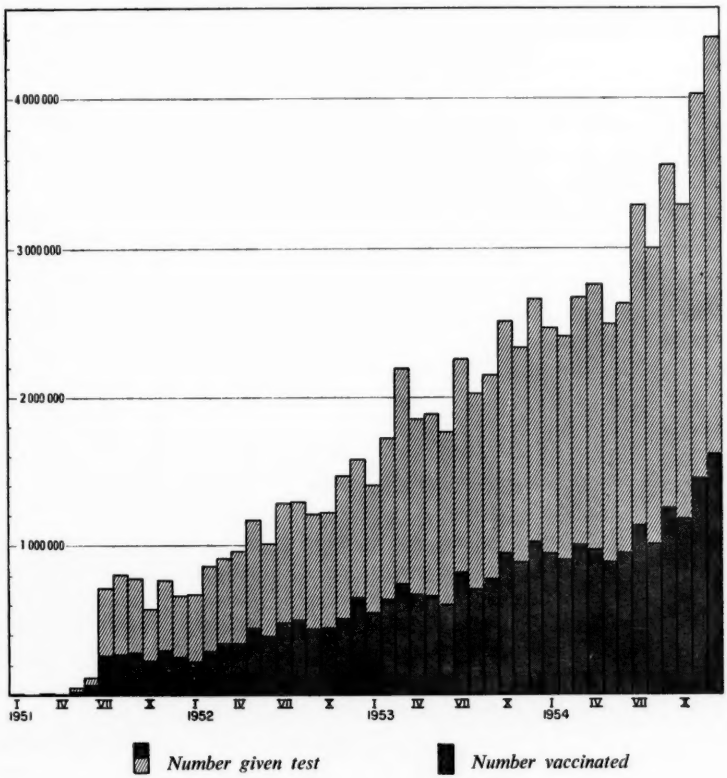
The 33 countries where WHO/UNICEF-assisted campaigns are, or have been, conducted are listed in Table I. By far the largest part of the programme has taken place in Asia, where by the end of 1954 campaigns had been completed in 5 countries and were still running in 14 countries. In two of the countries, India and Pakistan, campaigns were started by the ITC in 1949 and taken over by WHO/UNICEF in 1951; since 1951, 51 million people have been tested and 17 million vaccinated in the two countries. WHO/UNICEF launched campaigns in 15 other countries of Asia during 1951-53 and in one country, Viet Nam, in 1954. In Ceylon a BCG campaign was

* Material included in this report was compiled from monthly statistical tabulations sent to the WHO Tuberculosis Research Office from the various campaign headquarters. The data were analysed and the report prepared by Erik Iversen.

[1] *Bull. Wld Hlth Org.*, 1955, **12**, 301

[2] During the first nine months of 1955 an additional 33 million tests and 12 million vaccinations were given (provisional figures).

FIG. 1. NUMBER OF PERSONS TUBERCULIN-TESTED AND VACCINATED WITH BCG IN WHO/UNICEF-ASSISTED CAMPAIGNS, BY MONTH, 1951-54



started by the ITC in 1949 and taken over by the Government in 1951; WHO/UNICEF have given support to the campaign from May 1954. In Asia, excluding India and Pakistan, 23 million people had been tested and 10 million vaccinated by the end of 1954.

On the African continent, BCG campaigns so far have been carried out only in a few countries. The ITC started a campaign in Egypt in 1949, which was taken over by WHO/UNICEF in 1951 and by the Government at the end of 1952. In Ethiopia and Eritrea and in Libya campaigns were launched by WHO/UNICEF in 1953; these were still running at the end of 1954. In the Sudan a special tuberculin survey was carried out during the period April 1954-March 1955; in the course of this survey 65 162 tests and 26 602 vaccinations were given. Its aim was to determine whether there was a need for a mass BCG campaign in the Sudan, and, if so, how it should best be carried out. By the end of 1954, WHO/UNICEF had assisted in the testing of 3 million persons and vaccination of 1 million in the African countries.

TABLE I. NUMBER OF PERSONS TUBERCULIN-TESTED AND VACCINATED WITH BCG AND PERCENTAGE POSITIVE IN AGE-GROUP 7-14 YEARS, BY COUNTRY, 1951-54

Country	Campaign period	Number of persons				Percentage positive in age-group 7-14 years
		given test	with test read		vaccinated	
			total	negative		
Africa						
Egypt [a]	July 1951 - Dec. 1952	2 269 290	1 476 205	653 977	649 428	33 [b]
Ethiopia & Eritrea	May 1953 -	353 484	251 953	145 278	144 827	33
Libya	Feb. 1953 -	272 592	199 356	111 765	111 244	36
Sudan	April 1954 -	44 422	38 399	19 149	19 039	36
America						
British Guiana	March 1954 -	177 799	164 402	96 449	96 378	34
British Honduras	Sept. 1953 - April 1954	48 598	46 103	23 215	23 111	30
Colombia	Sept. 1954 -	625 392	559 151	345 171	343 931	24
Costa Rica	March 1952 - July 1954	262 728	248 250	197 907	195 116	13
El Salvador	Aug. 1951 - Nov. 1952	348 753	311 959	182 709	179 323 [c]	24
Jamaica	Oct. 1951 - July 1953	635 421	586 014	349 074	347 660	18
Leeward Islands, St. Kitts [d]	Nov. 1953 - Jan. 1954	24 366	23 432	8 610	8 610	
Paraguay	Aug. 1954 -	142 568	122 776	70 133	68 844	31
Trinidad and Tobago	April 1952 - May 1954	337 648	321 025	212 215	211 923	24
Windward Islands, Grenada	Jan. - April 1954	60 471	58 369	39 772	39 579	16
Asia						
Aden Colony	Feb. - May 1952	31 287	22 110	7 765	7 751	53
Brunei	Sept. 1952 - Dec. 1953	33 018	27 427	10 022	10 293 [c]	48
Burma	Dec. 1951 -	2 866 780	2 264 629	873 386	865 967 [c]	50
Ceylon [a]	May 1954 -	395 787	343 477	183 827	179 801	24
China, Taiwan	May 1951 -	3 600 260	3 161 070	2 115 864	2 112 285 [c]	36
Hong Kong	April 1952 -	357 827	306 770	80 769	91 483 [c]	76
India [a]	July 1951 -	40 269 379	31 488 593	13 355 913	13 219 546 [c]	...
Part A States:						
Andhra	Oct. 1954 -	146 885	107 636	45 992	45 774	...
Assam	July 1951 -	995 366	841 301	476 562	478 461	...

TABLE I. NUMBER OF PERSONS TUBERCULIN-TESTED AND VACCINATED WITH BCG AND PERCENTAGE POSITIVE IN AGE-GROUP 7-14 YEARS, BY COUNTRY, 1951-54 (continued)

Country	Campaign period	Number of persons				Percentage positive in age-group 7-14 years
		given test	with test read		vaccinated	
			total	negative		
Bihar	July 1951 -	4 114 289	3 756 984	1 937 304	1 932 645	...
Bombay	July 1951 -	2 309 859	1 934 233	526 437	516 190	...
Madhya Pradesh	July 1951 -	1 572 774	1 435 281	551 249	548 892	...
Madras	July 1951 -	599 859	524 550	222 083	214 485	...
Orissa	July 1951 -	1 241 391	959 588	400 259	395 330	...
Punjab	July 1951 -	4 402 706	2 990 162	1 246 551	1 237 500	...
Uttar Pradesh	July 1951 -	4 574 551	3 462 231	1 284 256	1 267 835	...
West Bengal	July 1951 -	3 279 342	3 011 161	1 302 637	1 282 507 [c]	...
Part B States:						
Hyderabad	July 1951 -	3 732 441	2 899 398	1 003 713	988 666	...
Kashmir	July 1951 -	904 431	701 563	321 656	318 815	...
Madhya Bharat	July 1951 -	1 807 133	1 202 601	507 622	501 579	...
Mysore	July 1951 -	1 690 614	1 183 927	687 072	681 154	...
Patiala and East Punjab States Union	July 1951 -	1 861 406	1 193 239	560 676	555 418	...
Rajasthan	July 1951 -	1 438 125	1 003 662	333 502	330 646	...
Saurashtra	July 1951 -	939 791	646 123	255 269	246 585	...
Travancore-Cochin	July 1951 -	1 947 231	1 652 282	818 796	815 983	...
Part C States:						
Ajmer	April 1952 -	306 958	222 581	68 998	66 760	...
Bhopal	April 1952 -	276 300	223 060	108 138	106 620	...
Coorg	Nov. 1953 -	21 469	18 696	14 481	14 451	...
Delhi	July 1951 -	1 161 847	774 155	258 017	255 368	...
Himachal Pradesh	March 1952 -	276 914	194 096	126 706	125 756	...
Kutch	Sept. 1951 -	13 530	10 983	5 168	4 845	...
Manipur	April 1952 -	248 623	216 865	132 691	130 165	...
Tripura	Nov. 1952 -	151 404	122 946	48 710	46 638	...
Vindhya Pradesh	July 1951 -	254 140	199 289	111 368	110 478	...
Indonesia [e]	Nov. 1952 -	2 029 531	1 528 157	397 066	395 097	63 [e]
Iran	May 1952 -	984 029	831 302	640 482	636 650	21
Iraq	Aug. 1952 -	565 105	468 237	206 726	204 110	49

TABLE I. NUMBER OF PERSONS TUBERCULIN-TESTED AND VACCINATED WITH BCG AND PERCENTAGE POSITIVE IN AGE-GROUP 7-14 YEARS, BY COUNTRY, 1951-54 (concluded)

Country	Campaign period	Number of persons				Percentage positive in age-group 7-14 years
		given test	with test read		vaccinated	
			total	negative		
Jordan [d]	Dec. 1953 -	255 236	220 141	132 283	130 900	. [d]
Malaya	Jan. 1951 - Dec. 1953	658 521	616 947	328 357	359 341 [c]	43
Pakistan [a]	July 1951 -	11 142 880	8 211 394	3 885 952	3 828 525	40 [b]
Karachi	July 1951 -	173 286	116 505	27 081	23 620	51 [b]
East Bengal	July 1951 -	2 070 023	1 717 603	744 183	710 668	41 [b]
Punjab	July 1951 -	5 747 775	3 877 539	1 830 795	1 817 707	41 [b]
Bahawalpur	July 1951 -	463 116	265 053	163 764	161 712	28 [b]
N.W. Frontier Province	July 1951 -	1 431 458	1 153 077	586 524	586 154	40 [b]
N.W. Frontier Tribal Area	July 1951 -	8 020	7 248	3 176	2 947	..
Sind	Jan. 1953 -	658 155	559 238	219 511	217 037	52 [b]
Khaipur	April 1952 -	44 634	37 131	23 964	23 893	31 [b]
Baluchistan Districts	July 1952 -	218 635	195 447	118 621	117 976	34 [b]
Azad Kashmir	May 1953 -	327 778	282 553	168 333	166 811	35 [b]
Philippines [a, e]	Oct. 1951 -	4 814 738	4 046 298	2 127 863	2 147 912	44 [e]
Sarawak	July 1952 - Dec. 1953	154 551	129 303	57 243	58 594 [c]	45
Singapore	June 1951 - Dec. 1953	95 104	89 556	35 506	36 592 [c]	61
Thailand [e]	Nov. 1951 -	2 458 416	1 950 277	968 673	966 181	35 [e]
Turkey [d]	Jan. 1953 -	3 890 948	3 477 834	1 608 725	1 599 778	. [d]
Viet Nam	March 1954 -	202 766	176 569	72 354	71 479	58
Total		80 409 695	63 767 485	29 544 200	29 361 298	.

. = not applicable

.. = % not given because of too few observations

... = data not available

[a] Before July 1951 the following work was carried out by the International Tuberculosis Campaign: Egypt: 2 104 311 tests given, 661 128 vaccinations; Ceylon: 306 707 tests given, 122 764 vaccinations; India: 4 129 570 tests given, 1 372 029 vaccinations; Pakistan: 923 342 tests given, 294 598 vaccinations. On Ceylon, furthermore, 827 516 persons were tested and 418 851 vaccinated under Government auspices between July 1951 and May 1954. The figures for the Philippines include 305 801 tests and 121 149 vaccinations given in tuberculosis and maternity clinics between April 1948 and December 1954.

[b] Based on results from the total campaign, including the ITC programme

[c] Including the following number of newborn children vaccinated without previous testing: El Salvador, 248; Brunei, 291; Burma, 1 787; China (Taiwan), 10 946; Hong Kong, 11 052; India, 478; Malaya, 32 757; Sarawak, 1 429; Singapore, 1 616.

[d] The data include testing and vaccination of some persons already tested and vaccinated in a local BCG vaccination campaign (St. Kitts, Turkey) or by ITC (Jordan) before the WHO/UNICEF-assisted campaign. The percentage of reactors therefore cannot be taken as an index of naturally acquired tuberculin sensitivity.

[e] The data include testing and vaccination of some persons already tested and vaccinated earlier in the WHO/UNICEF-assisted campaign. The percentage of reactors has been calculated on the basis of limited material excluding the data for return visits.

The WHO/UNICEF-assisted campaigns in America have, with a single exception (Paraguay), been limited to countries in Central America, the Caribbean area, and the northern part of South America. Campaigns were completed in El Salvador and Jamaica in 1952-53 and in British Honduras, Costa Rica, St. Kitts, Grenada, and Trinidad and Tobago in 1954. New campaigns were started in 1954 in British Guiana, Colombia, and Paraguay. By the end of 1954, a total of 2.7 million tests and 1.5 million vaccinations had been given in the American BCG campaigns.

Out of the 80.4 million persons given a tuberculin test, only 63.8 million returned for the reading of the test (see Table I). Thus 16.6 million, or 21%, were lost to the campaign. The percentage varies considerably among the different countries: for the American countries, the average loss was 8%; for India and Pakistan, 23%; for the other Asian countries, 16%; and for the African countries, as much as 33% (for the Sudan, however, only 14%). On the other hand, practically all (99.4%) of the 29.5 million persons found tuberculin negative were vaccinated.

The proportion of reactors to the tuberculin test, expressed as a percentage of the total number of persons completing the test, gives some indication of the prevalence of tuberculous infection. Such percentages should be interpreted with caution, however. Results from tuberculin surveys conducted with uniform techniques in different parts of the world [3] indicate that there are two kinds of naturally acquired tuberculin sensitivity: a high-grade sensitivity due to tuberculous infection, which is found everywhere, and a low-grade non-specific sensitivity, which is highly prevalent in some countries and absent in others. As the largest non-specific reactions to the tuberculin test cannot be distinguished from the smallest specific reactions, the percentages of tuberculin reactors for some countries will include a certain proportion of persons with strong non-specific reactions and will thus over-estimate the prevalence of tuberculous infection.

Table I gives the percentages of tuberculin reactors for the age-group 7-14 years for individual countries.[4] The percentages are comparatively low in the American countries, ranging from 13% for Costa Rica to 34% for British Guiana. In Africa the percentages are somewhat higher but still moderate, 33% to 36%. The percentages for the Asian countries are generally high but vary widely, from 21% for Iran to 76% for Hong Kong; most of the percentages fall within the range 30% to 65%. For Pakistan, percentages are given by administrative division; they show considerable variation, ranging from 28% for Bahawalpur to 52% for Sind.

For the five countries where the campaigns were completed during 1954, all situated in Central America or the Caribbean area, more detailed statistics are given in Tables II (by administrative division) and III (by age); in the previous report [5] similar statistics were given for the campaigns completed during 1952 and 1953. The percentages of positive reactors (Table II) vary widely from one part to another within these countries. In the two Central American countries, British Honduras and Costa Rica, high percentages are found in the coastal areas (Belize and Stann Creek in British Honduras; Puntarenas, Guanacaste and Limón in Costa Rica), and low percentages in the interior. A similar, though less distinct, trend is found in El Salvador. The percentages for urban areas are comparatively high in Costa Rica (San José), El Salvador (San Salvador),[6]

[3] See *Bull. Wld Hlth Org.*, 1955, 12, 63.

[4] The age distribution for the tested persons was not available for India; and for St. Kitts, Jordan and Turkey, the percentages give no true picture of the naturally acquired tuberculin sensitivity because the material includes testing and vaccination of persons already tested and vaccinated in an earlier campaign.

[5] *Bull. Wld Hlth Org.*, 1955, 12, 307-309

[6] *Bull. Wld Hlth Org.*, 1955, 12, 307

TABLE II. NUMBER OF PERSONS TUBERCULIN-TESTED AND VACCINATED WITH BCG, COVERAGE OF AGE-GROUP 0-14 YEARS, AND PERCENTAGE POSITIVE IN AGE-GROUP 7-14 YEARS, BY CIVIL DIVISION, IN CAMPAIGNS COMPLETED DURING 1954

Country and division	Number of persons				Coverage [a] of age-group 0-14 years (%)	Percentage positive in age-group 7-14 years
	given test	with test read		vaccinated		
		total	negative			
British Honduras	48 598	46 103	23 215	23 111	75	30
Districts :						
Belize	22 876	21 929	9 901	9 852	75	37
Northern	10 443	9 972	5 885	5 861	85	19
Cayo	5 750	5 460	3 488	3 483	78	17
Stann Creek	6 276	5 940	2 363	2 340	80	39
Toledo	3 253	2 802	1 578	1 575	49	24
Costa Rica	262 728	248 250	197 907	195 116	44	13
Provinces :						
San José, Canton Central	50 537	46 486	31 709	31 325	55	22
San José, Other cantons	51 432	49 015	42 857	42 252	45	9
Alajuela	41 783	40 505	35 652	35 241	39	7
Cartago	35 445	34 128	29 350	29 043	51	8
Heredia	19 251	18 504	16 542	16 262	55	6
Puntarenas	32 127	30 212	19 230	18 845	40	25
Guanacaste	17 805	16 836	13 784	13 539	31	16
Limón	14 348	12 564	8 783	8 609	43	24
Leeward Islands, St. Kitts	24 366	23 432	8 610	8 610	83	. [b]
Trinidad and Tobago	337 648	321 025	212 215	211 923	78	24
Cities and Towns :						
Port-of-Spain	64 221	61 195	39 470	39 333	77	21
San Fernando	19 365	18 768	12 165	12 149	81	25
Arima	5 149	4 916	3 328	3 328	88	21
Counties :						
St. George	72 754	68 800	47 664	47 598	68	18
Caroni	34 502	32 273	21 034	21 022	77	29
Victoria	57 512	55 157	35 833	35 865	89	28
St. Patrick	45 702	43 506	28 504	28 480	90	25
St. David	2 350	2 274	1 525	1 524	68	29
St. Andrew	12 473	11 675	7 900	7 893	71	25
Nariva	5 348	5 015	3 503	3 503	64	25
Mayaro	2 021	1 896	1 199	1 198	67	31
Island of Tobago	16 251	15 550	10 030	10 030	83	25
Windward Islands, Grenada	60 471	58 369	39 772	39 579	78	16
Parishes :						
St. George's	18 107	17 435	10 929	10 927	78	17
St. John's	7 824	7 441	4 665	4 560	96	18
St. Mark's	1 626	1 574	1 126	1 126	44	14
St. Patrick's	6 068	5 999	4 384	4 381	63	13
St. Andrew's	15 861	15 503	11 529	11 529	89	12
St. David's	5 784	5 444	4 147	4 064	73	8
Carriacou	5 201	4 973	2 992	2 992	82	35

[a] Coverage is defined as number of tests read as a percentage of the general population in the same age-group. The general population 0-14 years of age is estimated by applying the age distribution for the entire country to the population figures for each subdivision at latest census and raising the resulting estimates by the percentage increase of the total population from the census to mid 1953. The data are obtained primarily from the United Nations Demographic Yearbooks.

[b] See Table I, footnote (*d*). The percentage of positives found in the local BCG vaccination campaign conducted December 1952-May 1953 was 22.

TABLE III. NUMBER OF PERSONS TUBERCULIN-TESTED AND VACCINATED WITH BCG, BY AGE, IN CAMPAIGNS COMPLETED DURING 1954

Country	Number of persons with test read				Number of persons vaccinated			
	Age-groups (years)			Total	Age-groups (years)			Total
	0-6	7-14	15 and over		0-6	7-14	15 and over	
British Honduras	10 575	11 053	24 475	46 103	9 705	7 723	5 683	23 111
Costa Rica	62 779	104 997	80 474	248 250	58 455	90 206	46 455	195 116
Leeward Islands, St. Kitts	4 610	5 172	13 650	23 432	3 998	1 812	2 800	8 610
Trinidad and Tobago	84 435	111 122	125 468	321 025	79 155	84 597	48 171	211 923
Windward Islands, Grenada	12 584	14 902	30 883	58 369	12 041	12 372	15 166	39 579
Total, number	174 983	247 246	274 950	697 179	163 354	196 710	118 275	478 339
Total, %	25	35	47	100	34	41	25	100

and Jamaica (Kingston) but not in Trinidad and Tobago (Port-of-Spain).

The proportion of the child population (0-14 years) that participated in the campaigns is also shown in Table II (the " coverage "). The figures have been computed by relating the number of children with test read to the total number of children in the general population in the same age-group. While the coverage was relatively low in Costa Rica (44%), as many as 75%-83% of the children participated in the campaigns in the other countries. The coverage varies markedly from district to district within the countries.

The age-distribution of the population tested in the five countries (Table III) shows that, on the average, 25% were under 7 years of age, 35% were 7-14 years old, and 40% were 15 years or more. The corresponding figures for the individual countries show much variation, however. Thus the persons tested in Costa Rica were relatively young, only 32% being 15 years or more, while those in St. Kitts were rather old, with 58% above the age mentioned. The vaccinated population was, generally, younger than the tested population, since a relatively large proportion of the older persons were reactors to the tuberculin test and thus not eligible for vaccination. On the average, 34% of the vaccinated population were under 7 years of age, 41% were 7-14 years old, and 25% were 15 years or more.

Japanese Translation of the International Pharmacopoeia

A Japanese translation of Volume I of the International Pharmacopoeia was published in 1955 by the Nippon Shinyaku Co., Ltd., of Kyoto. The translation is by Dr Kiichiro Kakemi, member of the Board of the Japanese Pharmacopoeia, and has been supervised by Dr Tatsuo Kariyone, Member of the WHO Expert Advisory Panel on the International Pharmacopoeia and Pharmaceutical Preparations. The World Health Organization published the English and French editions of this volume in 1951 and the Spanish edition in 1954.

BCG VACCINATION IN PAKISTAN *

In August 1949 the Government of Pakistan, with the assistance of the International Tuberculosis Campaign (ITC), started to carry out a professional training and demonstration project with the aim of familiarizing Pakistani doctors and nurses with the technique of BCG vaccination. This project, which was to last for one year, gradually developed into a vaccination campaign covering the whole country, including both the rural and urban population. The international team arrived in Pakistan towards the end of July 1949; vaccination centres were opened shortly afterwards in Karachi, and then in refugee camps. In November 1949, several members of the international team went to Dacca, in East Pakistan, to train two provincial teams of vaccinators there. Later on, these two teams continued the demonstration work alone in the urban areas of the province. At the end of 1950, the programme was being applied in all the provinces of the country and was favourably received everywhere. This success led the Government to reconsider the programme completely; with the aid of UNICEF and WHO (which had taken over the activities of the ITC) it drew up a plan of operations for the whole country, with the aim of tuberculin-testing 20 million children and adolescents aged from 1 to 20 years before the end of 1956 and BCG-vaccinating the non-reactors to tuberculin. The campaign is not yet completed, but 15 million tuberculin tests and 5 million vaccinations had been carried out by September 1955.

* A more detailed account of this campaign, by E. Roelsgaard, H. Christensen & E. Iversen, will appear in a coming number of the *Bulletin of the World Health Organization.*

Organization of campaign

The central administration, assisted by the international team, is responsible for co-ordinating operations, but organization of the campaign in each province is entrusted to the provincial authorities. According to the size of the province, units of from 4 to 10 teams, each with 3-4 or 8 vaccinators, work in each province, which they systematically cover, district by district. Each unit is directed by one or two medical officers. Because of the shortage of qualified medical personnel, the vaccinators are recruited among young men who have completed their secondary studies. They are trained by the instructors of the international team for a period of 6 to 8 weeks, and are subsequently supervised by the medical officer in charge of the unit. They carry out their work under difficult conditions: for eight months of the year the temperature never falls below 30°C and sometimes reaches even 50°C; they must cover long distances, frequently on foot, to reach a village. Consequently, the daily programme is carefully planned so as to lighten their task. The team leader goes a week in advance to all the localities which are to be visited by the vaccinators. He there gets in touch with the village headman and with influential persons whom the headman may suggest, discussing with them the site of the vaccination centre and ways and means of assembling the local population. This preliminary planning is far from being a loss of time. It may even be said that its absence greatly hinders the operations; for whenever such preparations are neglected, the people are uninformed and indifferent. On the other hand, they show

interest when the operations are carefully organized.

Techniques of tuberculin testing and BCG vaccination

When the BCG programme was launched in 1949, practically nothing was known as regards the tuberculin sensitivity of Asian peoples, and it was decided to employ the same technique as that used for BCG campaigns in Europe. The Mantoux test was used for casefinding, i.e., the intradermal injection of 1 TU, followed by an injection of 10 TU in the event of a negative reaction. The reaction was considered positive if the induration measured 6 mm or more in diameter three days after the injection. Only persons who reacted negatively to both 1 TU and 10 TU were selected for BCG vaccination. This method, which required three visits, was simplified as soon as the results obtained by the Tuberculosis Research Office (TRO) with single injections of 10 TU or 5 TU became known.[2] A dose of 5 TU has been used since August 1950. The Moropatch test, which was applied at the outset to children under 12 years of age, was given up after a few months for various reasons, in particular because it was less sensitive in the case of Pakistani children than the Mantoux test.

Up to December 1949, PPD solutions ready for use were sent weekly to the vaccination team from the King Institute at Madras. Subsequently, they were prepared in a laboratory established at Karachi, which the Statens Seruminstitut of Copenhagen supplies with PPD stock solutions.

Persons with a negative tuberculin reaction are given 0.1 ml of vaccine containing 0.75 mg, moist weight, of BCG per ml, injected intradermally into the left deltoid region. The vaccine and the PPD dilutions are kept at a temperature of 2°-4°C, away from direct and indirect sunlight so as to prevent deterioration of allergenic potency.

The vaccine, which was supplied at the outset of the campaign by the King Institute of Madras, and then by the Statens Seruminstitut, has since February 1953 been prepared exclusively in the BCG production laboratory established at Karachi with the aid of the ITC. This laboratory has been authorized to produce the vaccine by the WHO Expert Committee on Biological Standardization.

Proportion of population tested and vaccinated

At the 1951 census, the population of Pakistan was 76 million; 12 million inhabitants underwent the tuberculin test between August 1949 and December 1954. Nevertheless, only 9 million attended for the reading of the test, so that a quarter of the tests were carried out in vain. Four million, or slightly less than half the persons completing the test, gave no reaction; and almost all of them (99%) have been vaccinated. The 9 million completing the tuberculin test represent 11% of the total population (13% of the men and 10% of the women). Although the campaign is aimed particularly at children and adolescents (16% of boys and 12% of girls less than 20 years of age have been tested), the proportion of people aged more than 20 who underwent the tuberculin test is 8%-9%.

The age distribution of the persons tested is as follows: under 7 years of age, 21%; 7-14 years, 29%; 15-19 years, 15%; 20 years or more, 35%. The corresponding figures for persons vaccinated are 32%, 36%, 13%, and 19%. As can be seen, the vaccinated population is, on the whole, younger than the tested population. This is due to the fact that a relatively high proportion of older persons reacted positively to tuberculin and consequently were not eligible for vaccination. Thus, among those less than 20 years

[2] See *Bull. Wld Hlth Org.*, 1955, 12, 169.

of age, the proportion eligible for vaccination was 60%, whereas above this age it was only 25%.

Distribution of reactions according to diameter of indurations

Tuberculin testing during mass campaigns can give an approximate idea of the prevalence of tuberculosis in a community. For this purpose, the population concerned should be divided into two separate groups, the infected and the non-infected. It may be asked to what extent classification according to the diameter of the induration enables such a distinction to be made. It is impossible to say with absolute certainty whether a person with a 4 mm or 5 mm reaction belongs to one or the other group. In West Pakistan it was found, however, that these "doubtful" reactions constituted only 4% of the total. In East Bengal medium-sized reactions are much more frequent than in West Pakistan and the distribution of reactions according to the diameter seems to indicate the presence of two types of tuberculin sensitivity: a high-grade sensitivity due to tuberculous infection and a low-grade non-specific sensitivity. The presence of non-specific sensitivity (which has been observed, moreover, in other parts of the world) would seem to limit considerably the usefulness of the tuberculin test, since the largest non-specific reactions cannot be distinguished from the smallest specific reactions. In West Pakistan it is difficult to classify persons developing indurations of 4-5 mm after the administration of a dose of 5 TU; in East Bengal the same problem arises for persons with reactions between 4 mm and 10 mm, i.e., 40% of the population tested. The results given by the 10 TU test are no easier to classify than those obtained with the 5 TU test.

Tuberculin sensitivity

In determining the prevalence of tuberculous infection on the basis of the number of persons found to be allergic to tuberculin, it was decided to exclude the figures for East Bengal, in view of the frequency of non-specific sensitivity in that province, as well as the data collected in the tuberculosis dispensaries and permanent BCG centres and during control tests. Similarly, the age groups "0-6 years" and "20 years and above" were excluded since their composition often varied greatly from district to district. Despite the precautions taken the results must be regarded with some reservation. A large number of persons tested did not bother to attend for the reading, perhaps because they felt their reaction to be positive. If this is the case, the number of persons recorded as positive would correspond to a fraction only of the real number.

Bearing these reservations in mind, the distribution of tuberculin-reactors of both sexes belonging to the age-groups 7-14 years and 15-19 years, respectively, is as follows: 48% and 65% in the provincial capitals, 45% and 62% in the urban areas, 41% and 56% in the rural areas. Allergy is generally more frequent among young men of 15-19 years than among girls of the same age. As to children aged 7-14 years, the study has revealed a very interesting fact, namely, that in the large towns the percentage of positive reactors is higher among boys than among girls, while in the other urban areas it is almost equal for both sexes, and in the rural areas it is higher among girls than among boys.

THE WORK OF THE INSTITUTE OF NUTRITION OF CENTRAL AMERICA AND PANAMA

The Institute of Nutrition of Central America and Panama (INCAP) was created in 1949 in Guatemala City on the initiative of the Government of Panama and of the Pan American Sanitary Bureau (PASB), for the purpose of providing States which are members of the Institute—Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, and Panama—with a technical centre for the investigation and practical solution of nutritional problems in these countries. The costs of the Institute are borne jointly by the participating governments, PASB (which acts as the WHO Regional Office for the Americas) being responsible for administrative direction and supervision.

The Council of INCAP is composed of a representative of each Member State, a representative of PASB, and a representative of the W. K. Kellogg Foundation, which is an honorary member of the Institute.

The purpose of INCAP is primarily to give advice and technical assistance to the governments of Member States for the prevention and treatment of nutritional deficiencies among their populations and to promote development of the science of nutrition by means of activities covering a wide field and including :

(*a*) clinical studies of nutrition ;

(*b*) surveys to ascertain the nutritional needs and dietary habits of the population;

(*c*) investigation and analysis of local foods;

(*d*) anthropological and genetic studies;

(*e*) studies of animal nutrition;

(*f*) instruction in the field of nutrition for agronomists, clinicians, biochemists, physicians, and educators, and training of specialists in nutrition;

(*g*) special projects;

(*h*) co-operation with universities and agronomic institutes of the region, and with other organizations and scientific groups working in related fields, for the purpose of improving traditional dietary customs and of finding rational solutions to the problems raised by deficiency diseases.

For the implementation of this vast scientific and practical programme, INCAP is obtaining the collaboration of the Massachusetts Institute of Technology (Department of Food Technology), the W. K. Kellogg Foundation, the Rockefeller Foundation, and FAO, which maintains close liaison with INCAP particularly in connexion with diet surveys for the purpose of discovering dietary patterns and of compiling tables showing the composition of foods.

As mentioned above, the Pan American Sanitary Bureau provides the Institute with technical advice and is responsible for administrative direction and supervision; it also makes available the services of specialists. Two members of the PASB fulfil the functions of Director and Deputy-Director of the Institute, which also receives financial assistance from PASB so that consultants may be called in and for technical and administrative meetings. WHO subsidizes INCAP for the promotion of studies for the evaluation of vegetable foods and food

preparations in the prevention and treatment of protein deficiency in children.

In order to put its activities on a practical basis, INCAP organizes programmes for the dietary education of the public, which are carried out by the governments of the Member States. Specialists in the malnutrition diseases prevalent in these countries —endemic goitre, multi-deficiency syndrome in children (kwashiorkor), avitaminosis A, anaemia, atherosclerosis, and pellagra— collaborate in the development of these programmes, and a modern building is available, adequately equipped for training courses, with conference and seminar rooms, a library, an experimental kitchen, a refrigeration room, and modern teaching material.

The Institute's scientific works are published in various medical journals in the Member States and in the United States of America, and also in the *Boletín de la Oficina Sanitaria Panamericana*. Supplements Nos. 1 and 2 of the *Boletín* [1] include several of the Institute's monographs.

Supplement No. 2 appeared in November 1955 and contains a series of articles on dietary surveys—which will undoubtedly serve as a point of departure for the establishment of future nutritional programmes for the region—a number of clinical studies of nutrition in Guatemala, El Salvador and Panama, studies of animal nutrition, food analyses, anthropological and genetic studies, tables showing the composition of foodstuffs, and an index giving the scientific and common names (with English translation) of food elements used by various Central American populations, prepared in collaboration with various health and agricultural authorities of the region.

[1] *Bol. Ofic. sanit. panamer.*, 1955, Supl. No. 2: *Publicaciones científicas del Instituto de Nutrición de Centro America y Panamá*, Washington, D.C.

Epidemiological and Statistical Information

MORTALITY FROM ACCIDENTS
(Other than Transport Accidents)

In countries with the best health conditions, accidents now cause more deaths than diseases, particularly among infants and adolescents. This apparent paradox, which can, however, be explained by the progress made in curative and preventive medicine, is brought out in the latest *Epidemiological and Vital Statistics Report* published by WHO,[1] which deals with mortality from accidents other than transport accidents. This study, the first of its kind on an international scale, complements the report published in 1953 on transport accidents.[2]

As in the Intermediate List of the 1948 International Statistical Classification of Diseases, Injuries and Causes of Death, the 74 types of accident (other than transport accidents) are grouped in 8 principal categories, as follows: (1) accidental falls; (2) accidental drowning and submersion; (3) accidental poisoning; (4) accident caused by fire and explosion; (5) accident caused by machinery; (6) accident caused by hot substance, corrosive liquid, steam, and radiation; (7) accident caused by firearms; (8) all other accidental causes.

Table I shows the percentages of deaths in 1953 from each of these categories of accident.

[1] *Epidem. vital Statist. Rep.* 1956, 9, 1

[2] *Epidem. vital Statist. Rep.* 1953, 6, 257; *Chron. Wld Hlth Org.* 1957, 8, 166

TABLE I. DEATHS FROM THE DIFFERENT CATEGORIES OF ACCIDENT (OTHER THAN TRANSPORT ACCIDENTS) AS PERCENTAGE OF ALL ACCIDENTS — 1953

Based on 1948 Intermediate List of International Classification

Type of accident	Ceylon	Canada	United States (all races)	Japan	Australia	New Zealand	Germany Federal Republic	Austria	Denmark	Finland	France	Ireland	Italy	Norway	Netherlands	United Kingdom			Sweden	Switzerland
																England and Wales	Scotland	Northern Ireland		
1. Accidental poisoning	3.0	7.1	5.1	4.8	6.3	5.9	5.5	12.8	11.0	12.2	7.0	3.5	4.5	4.9	3.4	9.8	16.5	5.7	4.5	5.2
2. Accidental fall	21.3	30.3	39.9	13.3	40.3	39.5	43.9	25.4	61.4	26.3	22.4	34.3	43.2	49.8	20.5	48.4	41.1	45.6	49.6	52.3
3. Accident caused by machinery	0.4	5.2	4.1	1.5	2.6	6.3	1.5	0.7	0.7	1.9	0.2	1.8	1.4	1.5	1.3	1.8	1.2	1.0	2.5	1.9
4. Accident caused by fire and explosion	13.6	9.8	12.7	5.8	6.1	5.0	2.3	2.6	1.9	5.8	0.4	7.0	4.3	2.5	0.7	6.1	5.0	5.7	5.1	0.9
5. Accident caused by hot substance	1.3	1.5	1.6	2.9	1.7	1.7	3.7	2.3	1.4	1.5	4.5	5.4	6.4	0.6	1.3	1.3	2.7	6.4	1.0	2.8
6. Accident caused by firearm	2.2	3.3	4.4	0.8	4.6	3.0	0.5	1.5	1.1	2.0	1.5	1.8	3.2	2.6	0.3	1.0	0.8	1.0	2.2	1.2
7. Accidental drowning and submersion	27.3	18.7	10.3	33.3	17.5	16.9	10.9	9.6	8.3	34.3	14.7	23.6	15.9	22.5	13.2	9.6	11.5	13.5	20.5	11.1
8. All other accidental causes	30.8	24.0	21.9	37.5	20.9	21.7	31.6	45.1	14.2	16.0	49.3	22.7	21.2	15.7	59.4	22.0	21.2	20.9	14.8	24.7

Mortality by sex and age

Three interesting facts emerge from the study of mortality from accidents by sex and by age and in relation to general mortality:

(*a*) Although in most countries accidents do not cause as many deaths as certain diseases, they nevertheless constitute one of the principal causes of death among particular age-groups.

(*b*) The male and female accident mortality rates vary considerably, being much higher for men for all categories of accident except falls, which are more frequently fatal among women of 60 years and over.

(*c*) The accident mortality rates among children, adolescents and old people are constantly rising.

Children of pre-school age are the chief victims (see Table II). Comparison of rates of mortality from particular accidents among infants under 1 year with the total accident death-rate for this age-group shows that the most frequent fatal accident in certain countries is suffocation: Italy, 27%; France, 31.7%; Netherlands, 54%; England and Wales, 74.6%; Canada, 80.3%; Scotland, 96.4%; Japan (1952), 74.5%.

TABLE II. PROPORTION (%) OF DEATHS FROM ALL ACCIDENTS (OTHER THAN TRANSPORT ACCIDENTS) COMPARED WITH THE GENERAL MORTALITY AT DIFFERENT AGES, ACCORDING TO SEX — 1953

Country	Male				Female			
	1-4 years	5-9 years	15-19 years	60 years and over	1-4 years	5-9 years	15-19 years	60 years and over
Canada	19.7	24.8	29.7	1.9	15.6	10.4	9.0	2.3
United States	18.8	22.7	23.0	2.1	17.2	16.8	7.3	2.6
Ceylon	2.1	7.1	16.5	1.8	1.8	7.0	6.5	0.7
Japan	12.1	20.9	14.2	1.1	8.9	8.3	4.3	0.7
Australia	18.1	21.8	21.1	1.7	15.3	10.7	4.3	2.4
New Zealand	22.8	27.7	15.6	1.5	20.2	10.3	6.9	2.2
Germany (Federal Republic)	22.1	23.9	25.0	1.7	15.8	12.6	6.9	1.8
Austria	23.9	29.1	37.5	2.3	24.0	15.3	12.9	2.1
Denmark	24.3	20.1	9.4	1.8	16.4	9.2	3.0	3.2
Finland	26.1	46.1	30.6	1.3	17.4	21.9	9.8	1.9
France	13.1	18.2	30.5	2.2	10.3	12.5	11.8	2.0
Ireland	5.7	12.0	14.2	1.0	9.1	8.7	1.3	1.2
Italy	8.2	10.3	19.6	1.1	6.2	7.0	4.5	0.6
Norway	23.2	36.6	23.5	2.3	14.6	16.0	6.1	2.8
Netherlands	31.5	39.4	33.0	2.0	22.8	28.8	32.4	2.3
United Kingdom								
England and Wales	12.6	18.3	15.9	1.1	10.5	8.5	4.1	1.8
Scotland	14.8	18.6	20.6	1.7	12.2	15.8	1.6	2.4
Northern Ireland	12.7	8.5	4.2	1.5	6.8	3.8	4.0	1.9
Sweden	23.4	29.6	14.0	1.3	20.0	10.8	2.1	1.9
Switzerland	25.6	21.8	23.0	2.1	20.1	10.3	8.5	2.3

TABLE III. PROPORTIONAL MORTALITY (%) BY AGE AND SEX FROM ACCIDENTAL FALLS COMPARED WITH TOTAL MORTALITY FROM ACCIDENTS (OTHER THAN TRANSPORT ACCIDENTS)

Country	Male				Female			
	all ages	-25 years	25-64 years	65 years and over	all ages	-25 years	25-64 years	65 years and over
Canada 1953	100	2.9	8.1	89.1	100	0.7	1.2	98.1
United States 1953	100	1.8	8.8	89.4	100	0.6	2.1	97.3
Japan 1952	100	9.8	25.6	64.6	100	6.6	9.0	84.4
Germany, Federal Republic 1953	100	3.5	8.3	88.2	100	0.6	2.2	97.2
Italy 1953	100	5.9	15.6	78.5	100	3.0	7.3	89.7
Netherlands 1953	100	2.9	6.8	90.3	100	0.7	2.4	96.9
England and Wales 1953	100	2.9	7.3	89.8	100	0.6	1.9	97.5

Mortality by type of accident

The percentages of deaths from all accidents (including transport accidents) in relation to the total death-rate differ considerably from country to country, varying from 2.4% in Ireland to 6.8% in Canada. The highest rates (6.1%-6.8%) were those for the Netherlands, USA, Australia, and Canada; in Sweden, Japan, Austria, France, Denmark, Germany, New Zealand, Finland, Norway, and Switzerland, the rates range from 4.3% to 5.4%; and in Ireland, Ceylon, England and Wales, and Italy, they vary from 2.4% to 3.3%.

Among the male population from 3% to 8.6% of all deaths are due to accidents, but only 1.4% to 4.8% among women.

Mortality from transport accidents

Transport accidents are responsible for 0.4%-3% of all deaths (1.8%-5.2% for the male as against 1%-4% for the female population). It has been statistically demonstrated that in some countries transport accidents account for as many deaths as tuberculosis, particularly among the young, and that they are more often fatal than nephritis, diabetes, or, in some cases, influenza. It is noted that mortality from transport accidents increases with age. The rate in 1953 was slightly higher than in previous years in some countries, but this tendency is not surprising if it is considered that the most serious accidents are caused by motor vehicles, the number of which is increasing at a considerable rate.

Study by category of accident (other than transport accidents)

Accidental falls

Comparison of the statistical data for the 18 countries covered in the *Report* demonstrates that in nearly all countries accidental falls are responsible for the greatest number of deaths from accidents. The persons principally affected are those 60 years old and over, and women predominate; in Canada, 98.1% of fatal accidents among women over 65 years of age were due to accidental falls. The percentages given in Table III are very significant.

Accidental drowning and submersion

Accidents from drowning and submersion constitute the next most important category of accident after falls. It is noted that, quite naturally, these accidents are more frequent in seaboard countries or countries where there are many lakes and rivers (Finland, Japan, Norway, Sweden, Canada, Ireland, Italy), in countries where a large part of the population is engaged in navigation and fish-

ing, and in countries with bathing resorts which attract large numbers of summer visitors each year (see Table I).

The rate of mortality from this type of accident is very high among children of both sexes in the age-group 1-4 years; of 8335 drowning accidents registered in Japan in 1953, 3682 occurred among children of this age. On the other hand, in France and England and Wales the age-group 60 years and over is the most affected by this type of accident. Figures for accidental drowning and submersion were proportionally highest in 1953 in Finland, where they constituted 34.3% of the deaths from all accidents except transport accidents.

Accidental poisoning

Accidental poisoning comes third in order of importance, although its importance varies according to country, sex, and age. The rate is high among children 1-4 years of age, but the highest rates are among age-groups over 40 years.

Accidents caused by fire and explosion of combustible material

Children and old people are the chief victims of accidents caused by fire and explosion of combustible material. The proportional figures are definitely higher in some countries (Canada and the USA) than in others, particularly among the age-groups 1-10 years and 60 years and over.

Accidents caused by machinery

The figures with regard to accidents caused by machinery refer mainly to men, particularly from the age of 15 years to 60. Deaths among women from this type of accident are almost non-existent.

Accidents caused by hot substance, corrosive liquid, steam, and radiation

Here again, children (1-4 years) of both sexes are the principal victims. In the USA, however, the highest rate of fatal accidents of this type is for men of 60 years and over, whereas in France women in this same age-group are the most affected.

Accidents caused by firearms

These accidents are definitely more frequent among the male population (15-60 years). In 1953 there were 124 fatal accidents of this kind in Denmark, Finland, Norway, and Sweden together, and only 3 of this number were women.

All other accidental causes

This group includes 20 titles, each referring to a particular type of accident (explosion of pressure vessel, excessive heat or cold, cataclysm, etc.) and 17 titles relating to complications due to medical procedures and late effects of accidents. It is for this reason that the percentages shown in Table I

TABLE IV. DEATHS FROM ALL ACCIDENTS (INCLUDING TRANSPORT ACCIDENTS) IN 1953

Crude death-rates per 100 000 inhabitants of each sex

Country	Both sexes	Male	Female
United States	60.0	84.9	35.9
Canada	58.6	84.4	32.0
France	58.3	81.8	36.3
Australia	55.5	79.8	30.5
Switzerland	55.5	81.5	30.9
Germany	53.6	81.9	28.6
Austria	52.8	71.1	31.8
Finland	49.7	74.6	26.9
Netherlands	49.3	63.2	35.5
Norway	43.6	61.8	25.7
New Zealand	43.5	61.3	25.5
Denmark	41.7	51.7	31.8
Sweden	41.4	59.6	23.4
Japan	39.3	58.2	21.2
England and Wales	33.6	43.1	24.9
Scotland	47.8	62.8	34.0
Italy	33.0	53.4	13.6
Ceylon	31.9	42.0	20.7
Ireland	28.1	36.6	19.3

TABLE V. MORTALITY BETWEEN 1 AND 19 YEARS OF AGE, BY SEX, FROM ALL INFECTIVE AND PARASITIC DISEASES IN 1953
Percentage of deaths from all causes

Country	Male				Female			
	1-4 years	5-9 years	10-14 years	15-19 years	1-4 years	5-9 years	10-14 years	15-19 years
Canada	12.6	11.7	9.7	7.9	15.1	15.0	19.8	13.2
United States								
White	10.4	9.3	6.9	3.4	10.9	10.9	8.4	5.9
Coloured	11.2	11.0	7.7	7.0	13.7	11.8	12.2	12.2
Ceylon	20.4	26.5	18.3	17.4	20.6	26.5	19.7	10.8
Japan	29.2	28.2	18.6	19.2	32.3	36.0	25.6	30.8
Germany								
Federal Republic	16.2	12.8	5.4	3.9	20.2	14.9	8.3	9.8
West Berlin	38.0	12.0	8.9		47.2	18.2	20.0	
Austria	17.3	10.1	7.9	4.4	16.2	19.8	12.1	13.6
Denmark	10.0	11.8	6.9	6.3	10.5	15.8	4.4	6.1
Finland	11.6	7.3	10.6	12.1	17.1	10.9	12.7	23.5
France	12.9	13.6	8.2	8.0	14.5	17.1	12.8	13.2
Ireland	26.6	27.0	20.3	21.7	25.9	24.3	25.7	35.0
Italy	17.6	20.3	12.0	9.7	18.9	22.1	19.2	21.4
Norway	8.8	8.2	13.8	2.9	15.4	16.0	8.3	14.3
Netherlands [a]	19.3	12.9	6.5	7.2	20.4	21.9	13.3	12.9
United Kingdom								
England and Wales	18.7	13.7	8.1	7.6	20.4	15.8	8.1	15.9
Scotland	17.4	11.0	9.9	6.2	24.4	5.3	20.5	23.0
Northern Ireland	13.9	4.3	11.8	14.6	13.7	30.8	14.3	8.0
Sweden	4.3	6.8	5.4	6.4	5.0	5.8	6.8	11.5
Switzerland	10.4	12.6	12.1	4.5	14.0	14.5	10.1	11.7
Australia	11.3	15.3	10.9	3.8	12.3	16.7	11.1	8.1
New Zealand	12.6	10.6	25.0	3.3	18.3	12.8	6.3	13.8

[a] 1952 figures

are so high, taking second place. The chief victims of these types of accident are infants under one year and persons of 60 years of age and over. It is interesting to note, however, that even between these two extreme age-groups the mortality rate is fairly high compared with that for other categories of accident for the same age-groups. " Other accidental causes " mainly affect men of all ages.

Table IV gives 1953 mortality rates, for selected countries, with respect to all accidents, including transport accidents. These figures are given, in order of importance, in crude rates per 100 000 inhabitants of each sex.

For purposes of comparison, Table V indicates mortality in 1953 from all infective and parasitic diseases among the age-groups 1-19 years.

Reports of Expert Groups

DRUGS LIABLE TO PRODUCE ADDICTION

In the sixth report of the WHO Expert Committee on Drugs Liable to Produce Addiction,[1] it is recommended that the following synthetic substances with morphine-like effect be considered addiction-producing drugs and therefore subjected to the relevant controls: 3-hydroxy-N-phenethylmorphinan, 4-morpholino-2,2-diphenyl ethyl butyrate, 4-dimethylamino-1,2-diphenyl-3-methyl-2-propionoxybutane, 3-diethylamino-1,1-di-(2′-thienyl)-1-butene (diethylthiambutene), and 1,3-dimethyl-4-phenyl-4-propionoxyhexamethyleneimine. However, (-)-3-hydroxy-N-allylmorphinan (levallorphan) and certain related compounds are not to be regarded as addiction producing. The report points out that the myristyl ester of benzylmorphine, although it possesses no addiction-producing liability in itself, constitutes a public health hazard because of its ready convertibility into benzylmorphine.

[1] *Wld Hlth Org. techn. Rep. Ser.*, 1956, **102**. 21 pages. Price: 1/9, $0.30, or Sw. fr. 1.—. Published in English, French, and Spanish.

It is noted in the report that the world licit production of diacetylmorphine (heroin) has shrunk from 839 kg in 1948 to 132 kg in 1954, and that, of the 20 States which have supplied production estimates for this substance for 1956, only 4 are not prepared to suppress its licit medical use. It is concluded that more and more physicians are now finding it possible to substitute less dangerous drugs for heroin.

Also considered in this report are the abuse of amphetamine in various areas, a matter which is as yet one for local rather than international action; and the use of pethidine, which is complicated by the fact that this drug is marketed under a variety of names, so that the physician is not always aware of the drug with which he is dealing and of the consequent dangers. The latter problem, the report points out, emphasizes the importance of identifying each new drug by its recommended or proposed international non-proprietary name.

Statistics of Cases of and Deaths from Communicable Diseases

Volume 9, No. 2, of the *Epidemiological and Vital Statistics Report* gives for a number of countries the monthly figures of notified cases of and deaths from cholera, plague, scarlet fever, poliomyelitis, and influenza. For some countries, recent medians are indicated (generally for the period 1946-1952) for purposes of comparison.

The notification figures give some idea of seasonal fluctuations and of the increase or decrease in incidence from year to year within given countries.

Notes and News

Associate Membership of WHO Requested for Gold Coast, Nigeria, and Sierra Leone

The United Kingdom Government has requested that the Gold Coast, Nigeria, and Sierra Leone be admitted to the World Health Organization as Associate Members. This request will be submitted to the Ninth World Health Assembly which opens on 8 May in Geneva.

Membership of the World Health Organization is open to all States, and territories and groups of territories which are not responsible for the conduct of their international relations may be admitted by the Assembly as Associate Members with rights and obligations as laid down by the first two Health Assemblies, in 1948 and 1949.

Proposed Trachoma Control in Iraq

Dr Vincent Tabone, WHO Consultant, recently visited Iraq in order to estimate the importance of trachoma as a health problem in that country. After making a survey covering 10 000 persons, Dr Tabone recommended that a national programme for the control of this eye disease be established under the Ministry of Health.

The programme as proposed provides for the training of the necessary staff and for the study of the various treatment schedules recommended by WHO as they apply to conditions in Iraq. Mass treatment would be given in general dispensaries, maternal and child health centres, and schools, and to members of certain groups, such as the police and the armed forces. A national centre would be set up in Baghdad and regional subcentres at Mossoul and Basrah.

In view of the importance for trachoma control of the co-operation of the general population, Dr Tabone recommended that a mass educational programme be undertaken in order to spread certain fundamental information about trachoma and other forms of infectious conjunctivitis frequently associated with it, and about their treatment and prevention.

Appointment of a Consultant on Trachoma for India and Indonesia

Dr M. Radovanovic, whose services have been lent by the Yugoslav Government, has been appointed WHO consultant on trachoma for India and Indonesia. Dr Radovanovic has wide experience in trachoma control in Yugoslavia, and also in campaigns undertaken in Yugoslavia with the assistance of WHO. At present he is studying the trachoma situation in India. Preliminary surveys are necessary to determine the epidemiology of the disease locally, before pilot projects can be developed which will indicate how mass campaigns will have to be organized. He will later proceed to Indonesia for a similar purpose.

Seminar on Tuberculosis Survey Methods

Leading national specialists in tuberculosis control services and WHO officials associated with tuberculosis control activities in Afghanistan, Burma, and Indonesia met in March in New Delhi with Indian experts and advisory staff of the WHO Regional Office for South-East Asia. During a seminar lasting three weeks they studied suitable methods for making national tuberculosis surveys. At its eighth meeting,[1] the Regional Committee for South-East Asia stressed the importance of these surveys, which enable the health services concerned to collect the information they need for establishing effective tuberculosis control programmes.

The national tuberculosis survey recently inaugurated by the Government of India is

[1] See *Chron. Wld Hlth Org.* 1955, 9, 321.

the second survey of this kind to be undertaken in the world, the first having been carried out in Japan.[2] The participants in the seminar were able to study in detail the methods employed by the Indian services, which were explained to them by Dr P. V. Benjamin, Tuberculosis Adviser to the Indian Government; Dr B. K. Sikand, Director, Delhi State Area, Indian National Tuberculosis Survey; Dr Raj Narain, Assistant to Dr Sikand; and Mr S. S. Nair and Mr G. P. Mathur, Statistical Officers in the Indian National Tuberculosis Survey. Dr E. J. T. McWeeney, Regional Adviser on Tuberculosis and Dr Enid Charles, Regional Adviser on Epidemiology and Health Statistics, both attached to the WHO Regional Office for South-East Asia, were responsible for directing the discussions.

Emergency Shipment of Iron Lungs to Argentina

In order to assist the health authorities of Buenos Aires to combat an epidemic of poliomyelitis which has broken out in that city and its vicinity, the Pan American Sanitary Bureau—which acts as the WHO Regional Office for the Americas—has sent 40 iron lungs to Argentina in urgent response to a request from the Argentine Government.

The Bureau has used its Emergency Fund to make the purchase, and the United States Air Force and Military Air Transport Service have supplied aeroplanes for transporting the lungs.

The Bureau has maintained close contact with the National Foundation for Infantile Paralysis, which has great experience in poliomyelitis work and which is also sending two outstanding specialists to Argentina. With funds made available by the International Co-operation Administration, the Foundation is also purchasing and sending equipment, including infant, juvenile, and portable iron lungs and several rocking beds.

The reports received by the PASB from the Argentine Government list 1310 cases of poliomyelitis, with 120 deaths, from 1 January to 12 March.

[1] See *Bull. Wld Hlth Org.* 1955, 13, 1041.

Epidemiological Study of Yaws in Java

A scientific report[3] has appeared on the mass yaws control campaigns which have been conducted for the past four years in Indonesia by the Government of that country with the assistance of WHO and UNICEF. The report is based partly on observations made in the research area in Twajas, a subdistrict in Central Java, where, out of a total population of 40 000, about 7000 cases of yaws have been detected during the campaigns, and partly on information collected by the author in a village in Twajas in which practically every inhabitant of 529 households was clinically and serologically examined. This survey is a valuable contribution to the study of the epidemiology of yaws, not only on account of the mass of useful material it provides, but also from the point of view of the thorough analysis made by the author of the sociological, demographic, and economic factors of the disease.

Appointment of a USSR Specialist

Dr Olga Makeeva, former chief of the obstetrical and gynaecological service in the Moscow City Department of the USSR Ministry of Public Health, and former holder of the Chair of Gynaecology and Obstetrics in the Post-Graduate School of Medicine, Moscow, has been appointed to the combined maternal and child health and public-health training project being launched by the Government of the State of Saurashtra, India. Dr Makeeva is the first USSR national to take part in the work of WHO in a purely technical capacity.

A New Zealand Nurse-Educator in Taiwan

Miss Merle S. Farland has been appointed as nurse-educator to the maternal and child health project in Taiwan which is being implemented by the Government with the assistance of WHO. Before proceeding to her duty station, Miss Farland visited mater-

[3] Klokke, A. H. (1955) *Yaws in the households of Twajas (Central Java); an epidemiological study from the treponematoses control program in Indonesia*, Surabaja

nal and child health centres and hospitals at Manila and Cebu in the Philippines. She also called in at Singapore in order to study the nursing aspects of a number of projects which are being developed there and in which WHO is participating.

Before this appointment, Miss Farland was matron of the Apia Hospital in Western Samoa, and earlier she was the principal of the Lautoka Nursing School in Fiji. As a member of a Colombo Plan team, she has also worked at the Dacca Medical College Hospital in East Pakistan.

Experts Visit the New Quarantine Station at Jeddah

At the invitation of the Government of Saudi Arabia, three quarantine experts and an official of the WHO Regional Office for the Eastern Mediterranean visited the new quarantine station which has been installed at Jeddah for the reception and health control of pilgrims to Mecca. The experts were Professor A. Halawani, Director-General of the Endemic Diseases Department of the Egyptian Ministry of Health; Colonel M. Jafar, Director of Health of Pakistan; and Professor G. H. Canaperia, Director of the International Health Services Office of the Italian High Commissioner for Public Health and Hygiene, Italy. They were accompanied by Dr Wasfy Omar, Chief of the Epidemiology Section of the WHO Regional Office for the Eastern Mediterranean, who acted as secretary to the mission. The experts were also invited by the Saudi Arabian Government to visit other health institutions.

Appointment of a Dental Health Consultant for the Philippines

A recent law passed by the Congress of the Philippines providing for the establishment of rural health units throughout the country stipulates that dental health services are to be set up at various points. At the Government's request, WHO has appointed a dental health consultant—Dr J. L. Saunders—who will go to the Philippines to study, together with the Chief of the Dental Health Division of the Ministry of Health of that country, the details of the programme which is to be implemented.

Dr Saunders has wide experience in the organization and administration of dental health services: he was formerly Director of the Division of Dental Hygiene of the Department of Health of New Zealand, and he has also given assistance in an advisory capacity to the Governments of Ceylon, the Federation of Malaya, Thailand, and Indonesia in the development of their dental health programmes.

Creation of the First School of Nursing in Libya

On the recommendations of Mrs H. Kurban who, as a WHO nurse consultant, has spent several months in Libya studying that country's needs in nursing personnel, the Libyan Government plans to create a school of nursing in Tripoli. It is expected that WHO, UNICEF and USICA (Point 4 programme) will assist by providing staff and teaching equipment.

Both men and women will be admitted, and the nursing course will cover three to four years. Students who obtain the diploma will be attached to hospitals and health centres.

This programme will undoubtedly raise the status of nurses, whose prestige up to the present has not been very high and who have been poorly paid. It is believed that the school will also play an important part in raising the country's health standards.

Opening of a School for Health Assistants in Nepal

The opening of the first health assistants training school at Kathmandu represents an important step in the development of health services in Nepal, for the new health programmes require more medical staff than is at present available in the country. While physicians will continue in the immediate future to study abroad, it will now be possible for assistant personnel to be trained within the country.

A public health specialist and a sanitarian sent by WHO have been made responsible

for giving advice and assistance to the teaching staff in that part of the programme covering sanitation, communicable disease control, health education, and first aid. Officials of the Ministry of Health will also give courses in their various specialities. The first group of 20 students will complete their studies in two years.

In addition to its role as a teaching establishment, the school is to serve as a centre to which qualified public health service personnel can apply for advice on certain problems, for specialized documentation, and for visual aids.

Opening of a Physiotherapy School in Pakistan

The Federal Government of Pakistan has just opened a school for the training of physiotherapists in the Jinnah Central Hospital, Karachi. The first 12 students will be admitted in the near future.

The school is under the direction of Miss Zulekha Sobani, who will be assisted during the first two years by Miss Diana Kidd, WHO physiotherapist adviser, who has had wide experience of teaching physiotherapy in other countries. WHO will provide equipment, supplies, books, and other teaching aids.

The Jinnah Central Hospital already has a physiotherapy department directed by Miss Sobani. The scheme assisted by WHO provides for the development of this department so that modern methods of physiotherapy and the rehabilitation of physically handicapped persons can be taught there. The Government will grant study fellowships to attract candidates with the necessary ability. It will also provide buildings and personnel as well as equipment and supplies that are available within the country.

Seventh Seminar on World Health

The World Federation of United Nations Associations (WFUNA) is again organizing, during the Ninth World Health Assembly this year, a Seminar on World Health which will be held from 7 to 18 May 1956. This Seminar will enable future physicians, public health administrators and paramedical workers from all over the world to understand better the aims and activities of WHO and to learn something of existing international health problems.

As in previous years, the participants in the Seminar will be able to hear lectures given by regional directors and members of the WHO Secretariat and to attend meetings of the World Health Assembly. They will also have free access to the Organization's library where they will be able to peruse all WHO publications.

New Contribution to the Special Account for the Eradication of Malaria

The Federal Republic of Germany has just contributed a sum of 200,000 DM ($50 000) to the special account for the eradication of malaria. This fund was instituted by the Eighth World Health Assembly in May 1955 for the purposes of financing scientific research and of providing technical services and equipment for countries campaigning against malaria with a view to complete eradication of this disease. The fund is constituted by voluntary contributions from governments or private persons. The gift from Germany is the third of its kind; Brunei and China were the first two donors.

Publication of the Proceedings of the Geneva Conference on Atomic Energy

The United Nations, which undertook to publish in their entirety the proceedings of the International Conference on the Peaceful Uses of Atomic Energy held in August 1955 in Geneva, has announced that this publication will shortly appear. It may be said to represent the first complete reference work on the peaceful uses of atomic energy, and it will remain the standard text on the subject for many years. There are 16 volumes in all, each of about 550 pages; they will comprise all papers submitted at the Conference and the verbatim records of the discussions to

which the papers gave rise. The questions relating to health and medicine [4] are dealt with more particularly in the following four volumes: Volume 10—Radioactive Isotopes and Nuclear Radiations in Medicine (three chapters: " Isotopes in Medicine and Biology ", " Therapy ", " Diagnosis and Studies of Disease "); Volume 11 — Biological Effects of Radiation (five chapters: " Modes of Radiation Injury and Radiation Hazards ", " Mechanisms of Radiation Injury ", " Protection and Recovery ", " Genetic Effects ", " Human Implications "); Volume 12 — Radioactive Isotopes and Ionizing Radiations in Agriculture, Physiology, and Biochemistry (six chapters including " Animal Physiology " and " General Biochemistry "); Volume 13 — Legal, Administrative, Health and Safety Aspects of Large Scale Use of Nuclear Energy (three chapters: " Legal and Administrative Problems ", " Reactor Safety and Location of Power Reactors ", " Safety Standards and Health Aspects of Large Scale Use of Atomic Energy "). These publications will appear in English, French, Russian, and Spanish.

[4] See *Chron. Wld Hlth Org.*, 1955, 9, 303.

Review of WHO Publications

Bulletin of the World Health Organization, 1956, Volume 14, Number 2 (pages 187-352)

This number of the *Bulletin*, which deals with recent progress in serological techniques in syphilis, is the subject of an article on page 123 of this number of the *Chronicle*. It contains the following papers: " Serology of treponematoses: recent developments ", by Charles R. Rein & Alice Reyn; " Present status of serological tests for syphilis ", by Ad Harris & Sidney Olansky; " Biologically false positive reactions to serological tests for syphilis ", by George H. Kostant; " The modern diagnosis of syphilis ", by Sidney Olansky & I. N. Orpwood Price; " The *Treponema pallidum* immobilization test ", by Hans Aage Nielsen & Alice Reyn; " *Treponema pallidum* agglutination tests ", by Harold J. Magnuson & Charlotte P. McLeod; " La réaction d'adhérence-disparition ", by G. L. Daguet; and " Transmission of blood and serum samples ", by I. N. Orpwood Price. There is also a select bibliography on the serology of syphilis.

SEROLOGY OF SYPHILIS

Serology of treponematoses: recent developments

Present status of serological tests for syphilis

Biologically false positive reactions to serological tests for syphilis

The modern diagnosis of syphilis

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